Examining Scholars' Activity on a Chinese Blogging and Academic Social Network Site

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Abstract. This study analyzes scholars' activity on a popular academic blogging and social network site (SNS) in China, ScienceNet. We collected blogs, comments, recommendations, likes, and user profile information and analyzed how different groups of users differ in their patterns of activity with others in different disciplines, professional ranks, and universities. Results indicate that: 1) scholars in management and mathematics are active in recommending and commenting other users; 2) scholars from well-known universities and research institutes often receive more comments and recommendations than those from other universities; 3) scholars with higher professional ranks are more active, and are more likely to receive comments and recommendations from others. These findings suggest different usage of academic SNS among scholars of different disciplines, ranks, and universities.

Keywords: Academic Social Network Site, User Activities, Academic Characteristics.

1 Introduction and Related Research

Social network sites (SNS) are regularly used as online communication platforms to help users build online social networks [1]. Academic social network sites are social network sites that aim at providing researchers with access to online academic discussion [2]. Compared to traditional SNSs, academic SNSs are more professional and provide functions related to research communication and exchange of ideas. Scholars can use SNSs to communicate progress and trends with their peers, carry out cooperative projects, exchange academic information, and promote their research activities [3]. Zaugg found that Mendeley's function of downloading and synchronization management of documents could help researchers in the same group to share literature. The recommendation function helps researchers to discover literatures and scholars that are in the same research field [4].

Previous studies have focused on researchers' use of SNSs for academic purposes and factors that affect researchers' use of SNSs. For example, Sugimoto found that researchers with different academic ranks and fields of research had different motivations to use social platforms, and they tend to publicize, communicate, and promote

their own research on the platform. Factors including age, job title, gender, discipline, country, and language affected researchers' use of social platforms [5]. Thelwall found that ResearchGate article views have low correlations with both Scopus citations and Mendeley readers [6]. Ortega analyzed the use of four academic social network sites by researchers in the Spanish National Research Council and found that researchers in the humanities and natural sciences are more active on the websites, researchers of biomedical fields are less active, and the distributions of user disciplines in the websites are also varied [7]. Duan found that the social patterns of users in various disciplines are different in ScienceNet. Users of information disciplines are in the center of the network. Researchers in management discipline are more likely to build online social networks, and researchers in engineering material disciplines are the least active [8]. Xu found that recommendation behavior was more frequent than commenting behavior in ScienceNet. In addition, discipline commentary matrices had significant differences from discipline recommendation matrices in in-degree centrality, out-degree centrality, and in-closeness centrality [9].

ScienceNet is a blogging and academic SNS popular among scientists in China. This website's main users are researchers, faculty, and graduate students. After posting blogs on the platform, users can receive recommendations and comments from other users, as well as reply to feedback. This study uses ScienceNet to explore academic characteristics that affect user activity on academic SNSs. We sampled 27,061 blogs posted by 1,965 active bloggers between 2007 and 2017, as well as activities such as comments, likes, recommendations among bloggers and other users. We analyzed the relationship between users' academic characteristics including field of research, academic ranks, and universities and activity frequency to answer the following research question: how different groups of users differ in their patterns of activity with others in different disciplines, academic ranks, and universities?

2 Methods

2.1 Data Collection

This study sampled 1,965 bloggers whose profile data is accessible in both ScienceNet and an academic journal database CNKI to analyze other users' activity frequency. The dataset includes users' profile data, as well as the interaction activities. Table 1 shows the fields of this dataset, including personal data and relationship data.

Table 1. Data collected

Profile data	Relationship data
User ID	Blogger's ID
User name	Other user's ID
University	Recommendations
Department	Comments
Discipline	Replies
Academic Rank	Following/followed

2.2 Data Preprocessing and Analysis

We counted the activity frequency between each blogger and every user, including the frequency of other users' recommendations, comments, as well as the blogger's replies to other users. We also extract each user's academic characteristics, including academic ranks, education, disciplines, and so forth.

We then divided blogger's universities or institutes into different tiers, "Project 985" universities, "Project 211" universities, other first-level universities, and second-level universities. First-level universities are considered more selective than second-level universities. "Project 985" universities (39) and "Project 211" universities (73) are top first-level universities. If a user worked in one domestic university and one foreign university, we used one university that locates in China. If a user worked in more than one domestic universities, we used one university according to the user's publication in CNKI.

We divided the users' academic ranks into professor, associate professor, assistant professor/lecturer, and junior ranks according to professional title qualification system in China [10]. We sampled eight board disciplines, including management discipline, mathematical science, engineering material, and so forth.

We conducted variance analysis to compare the differences in the activity frequency among users of different disciplines, universities, and academic ranks. If there are significant differences among the groups, we use post hoc tests to explore the differences.

3 Results

3.1 Long-tailed Distributions

Analysis of the frequency and friendship between bloggers and other users indicate that 30% of the users are friends in the community; the average commenting frequency is 2.3 and the average reply is 0.85; reply behavior is less frequent than commenting behavior; average recommendation frequency is 2.99. All frequencies of comments, replies and recommendations follow a long-tailed distribution. The activity frequencies are low among most users, and the proportion of users with high activity frequency is small. The distribution of recommendations is shown in Fig.1.

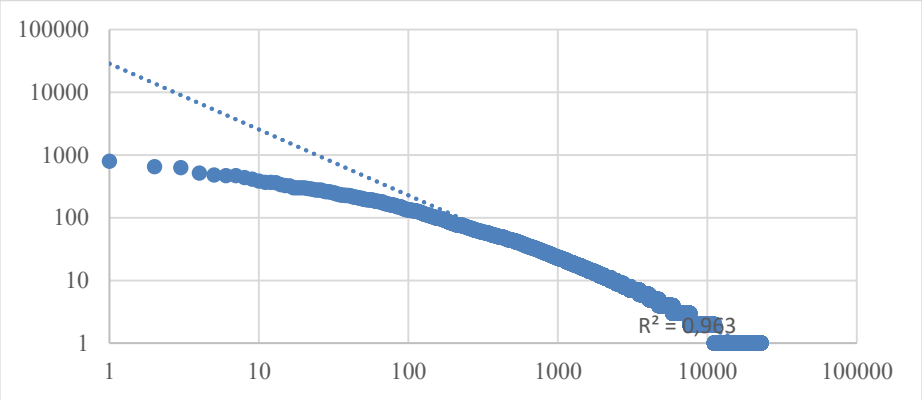

Fig. 1. Distribution of recommendations

3.2 Disciplines

User relationships were divided into two groups according to whether the user's discipline is the same as the blogger's. We used the independent sample T-test to compare the difference in frequencies of recommendations, comments, and replies of the two groups. There is significant difference in the number of recommendations (t=2.032，p=0.042) and comments (t=2.220，p=0.026). The average frequency of recommendations among users in the same discipline is 3.27, and the average frequency of recommendations among users in different disciplines is 2.92. The average frequency of comments between users in the same discipline is 2.47, and the average frequency of comments between users in different disciplines is 2.26. The frequency of comments and recommendations among users in the same discipline are higher than those in different disciplines. People tend to read blogs related to their interests and communicate with bloggers in similar fields.

We also perform a chi-square test to analyze whether users and bloggers being in the same discipline relates to their friendship. The result shows that there is a correlation between two variables (χ^2 =575.135，p=0.00). Particularly, 40.1% of users in the same discipline are friends with each other, and 27.3% of users in different disciplines are friends.

We analyze the relationship between user discipline and communicative tendency. The variance analysis method was used to compare the difference in frequencies of recommendations and comments of users in various disciplines. There are significant differences in frequency of recommendations (F=20.602, p=0.00) and comments (F=4.760, p=0.00). For the number of recommendations, users of management discipline send more recommendations than users of other disciplines significantly; users in mathematical science send more recommendations than users of earth science, life science, and medical science; users of engineering material discipline send more recommendations than users of earth science and medical science. The average numbers of recommendations for user in each discipline are shown in Fig.2.

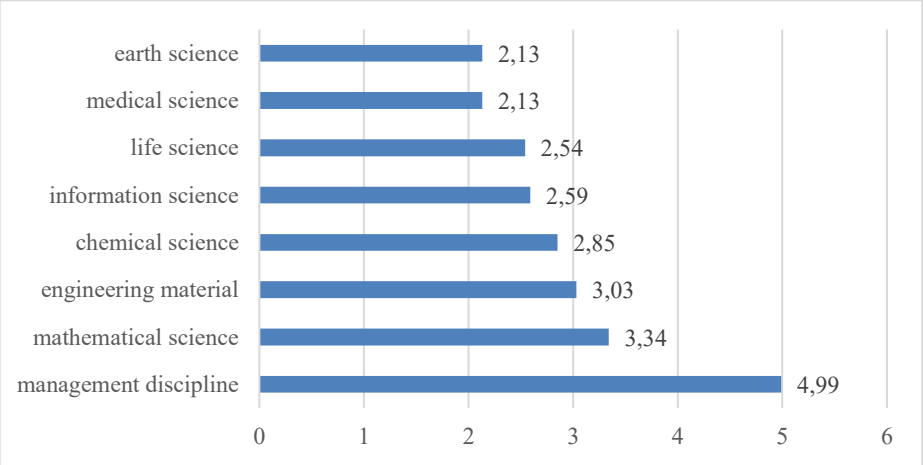

Fig. 2. Average numbers of recommendations for user in each discipline

For the number of comments, users of mathematical science send more comments than users of earth science, life science, information science and medical science; users of management discipline send more comments than users of earth science and medical science; users of engineering material discipline send more comments than users in medical science. The average numbers of comments for user in each discipline are shown in Fig.3.

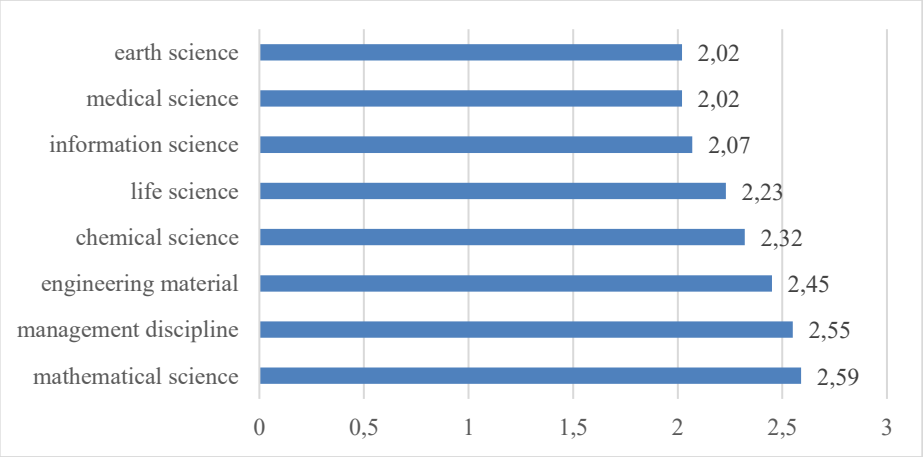

Fig. 3. Average numbers of comments for user in each discipline

Therefore, users of management discipline and mathematical science have a stronger social tendency, and are more active in recommending and commenting to other bloggers. Users of medical science and earth science are relatively inactive in the community and seldom communicate with other bloggers.

3.3 Tiers of University

We use the variance analysis method to compare the frequencies of comments and recommendations received by bloggers from different tiers of universities. The results show that the frequencies of comments (F=16.958, p=0.00) and recommendations (F=16.897, p=0.00) received by bloggers from different tiers of universities are significantly different.

Bloggers from second-level universities and first-level universities receive fewer comments and recommendations than users from “Project 985” universities, “Project 211” universities, and research institutes. The average numbers of comments and recommendations received by bloggers from different tiers of universities are shown in Fig.4. The results show that bloggers from research institutes and famous universities usually receive more comments and recommendations than those from other universities.

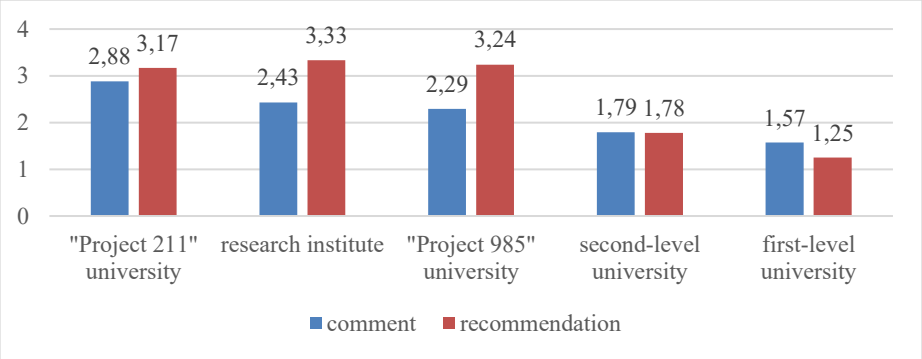

Fig. 4. Average numbers of comments and recommendations received by bloggers from different tiers of universities

3.4 Academic ranks

Variance analysis methods were used to compare the difference in the frequencies of recommendations and comments received by bloggers with different academic ranks. The results show that there are significant differences in the frequencies of recommendations (F=36.827, p=0.00) and comments (F=21.862, p=0.00).

For the number of comments, in addition to assistant professor/lecturer and junior ranks, there are significant differences among the four academic ranks. For the number of recommendations, there are significant differences among the four academic ranks. Users who are professors have the highest average in all three variables. Bloggers with higher academic ranks are more likely to publish high-quality blogs and gain the attention of other users. The average numbers of comments and recommendations received by bloggers with each academic rank are shown in Fig.5.

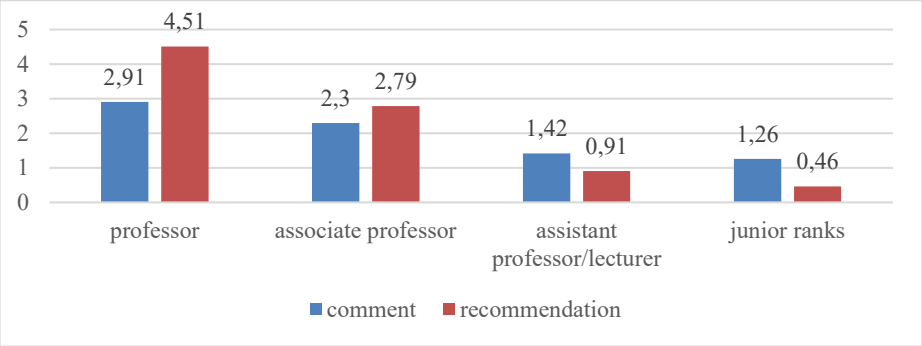

Fig. 5. Average numbers of comments and recommendations received by bloggers with each academic rank

Similarly, we use variance analysis to compare the frequencies of comments and recommendations sent by users with different academic ranks. There are significant differences in the frequencies of comments (F=15.903, p=0.00) and recommendations (F=28.138, p=0.00). According to results of post hoc testing, there are significant differences in the number of comments among users with the four academic ranks. For the number of recommendations, in addition to assistant professor/lecturer and junior ranks, there are significant differences among the four academic ranks. Users with high academic ranks are more active in the community and more inclined to communicate with other users. The average numbers of comments and recommendations sent by users with different academic ranks are shown in Fig.6.

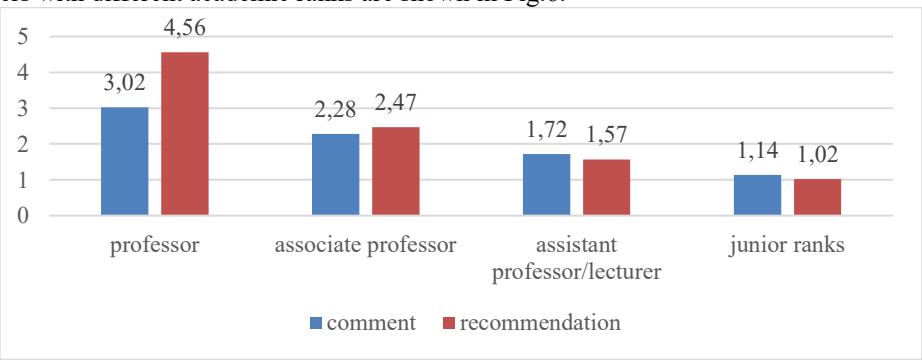

Fig. 6. Average numbers of comments and recommendations sent by users with each academic rank

4 Conclusion

This research analyzes the personal factors that influence users' activity in academic social network sites. We analyzed blogs posted by 1,965 bloggers whose profile data is accessible in both ScienceNet and an academic journaldatabase CNKI. We explore how users' academic characteristics influence users' activity frequency in ScienceNet, and

the result shows that users of management discipline and mathematical science are more active in recommending and commenting to other bloggers. Users of medical science and earth science are relatively inactive in the community. People tend to communicate with bloggers in similar fields. Additionally, bloggers from famous universities and research institutes often receive more comments and recommendations than those from other universities. Users with high academic ranks are more active in commenting and recommending others, and are likely to receive more comments and recommendations in the community.

Limitations of this study include the fact that ScienceNet was formed in recent years and the user scale is less than famous academic social network sites abroad. Frequencies of activity among users are low, and the research data set is affected by user activity. Then, it is difficult to access users' profile. Only bloggers whose profile data is accessible are included in this study. Besides, some users worked in more than one university. In future studies, we will use dataset of other mature websites to explore the activity patterns among users.

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